

We claim:

1. A wood preservative composition comprising:

(a) an inorganic component selected from the group consisting of a metal, metal compound and combinations thereof; and

5 (b) one or more organic biocides

wherein at least the inorganic component or the organic biocide is present as micronized particles.

2. The composition of claim 1 wherein the inorganic component is present as

10 micronized particles.

3. The composition of claim 1, wherein the organic biocide is present as

micronized particles.

15 4 The composition of claim 1, wherein both the inorganic component and the organic biocide are present as micronized particles.

5. The composition of claim 2, wherein the inorganic component is selected from the group consisting of copper, cobalt, cadmium, nickel, tin, silver, zinc and compounds 20 thereof.

6. The composition of claim 2 wherein the micronized inorganic component is copper, copper compound or combinations thereof.

25 7. The composition of claim 6, wherein the copper compounds are selected from the group consisting of copper hydroxide, copper oxide copper carbonate, basic copper carbonate, copper oxychloride, copper 8-hydroxyquinolate, copper dimethyldithiocarbamate, copper omadine and copper borate.

30 8. The composition of claim 1 wherein the micronized particles have a size of between 0.005 microns to 25 microns.

9. The composition of claim 8 wherein the micronized particles have a size of between 0.005 to 10.0 microns.

10. The composition of claim 9 wherein the micronized particles have a size of 5 between 0.05 to 10.0 microns.

11. The composition of claim 10 wherein the size of the micronized particles is between 0.05 to 1.0 microns.

10 12. The composition of claim 7 wherein the organic biocide is selected from the group consisting of biocides listed in Table 1.

13. The composition of claim 1, wherein the inorganic component is copper carbonate or copper hydroxide and the organic biocide is a quaternary ammonium compound 15 selected from the group consisting of alkyldimethylbenzylammonium chloride, dimethyldidecylammonium chloride and dimethyldidecylammonium carbonate.

14. The composition of claim 13, wherein the inorganic component is copper carbonate and the organic biocide is dimethyldidecylammonium carbonate.

20 15. The composition of claim 14, wherein the size of the copper carbonate particles is between 0.05 and 1.0 microns.

16. The composition of claim 12, wherein the inorganic component is copper 25 carbonate and the organic biocide is tebuconazole.

17. The composition of claim 1, wherein the inorganic component is a water soluble metal compound and the organic biocide is present as micronized particles.

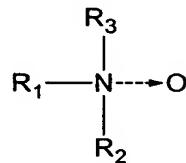
30 18. The composition of claim 17, wherein the inorganic component is selected from the group consisting of copper nitrate, copper sulfate and copper acetate.

19. The composition of claim 1, further comprising an agent selected from the group consisting of water repellants, colorants, emulsifying agents, dispersants, stabilizers and UV inhibitors.

5 20. The composition of claim 1, further comprising one or more enhancing agents.

21. The composition of claim 20, wherein the enhancing agent is a trialkylamine oxide having the following structure:

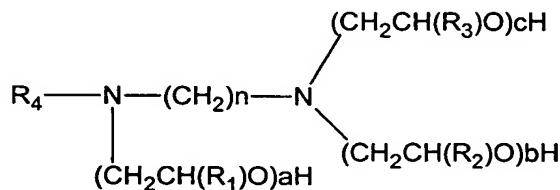
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15 where R₁ is a linear or cyclic C₈ to C₄₀ saturated or unsaturated group and R₂ and R₃ independently are linear C₁ to C₄₀ saturated or unsaturated groups.

22. The composition of claim 20, wherein the enhancing agent is an alkoxyLATED diamine having the following structure:

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where n is an integer which can vary from 1 to 4; R₁, R₂ and R₃ are independently selected from the group consisting of hydrogen, methyl, ethyl and phenyl; a, b and c are each integers from 1 to 6; and R₄ is fatty alkyl of C₈ to C₂₂.

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23. A method for preserving a wood product comprising the step of contacting the product with a wood preservative composition comprising: (a) an inorganic component

selected from the group consisting of a metal, metal compound and combinations thereof; and
(b) one or more organic biocides,

wherein at least the inorganic component or the organic biocide is present as micronized particles.

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24. The method of claim 22, further comprising the step of pressure treating the wood product with the preservative composition.

10 25. The method of claim 23, wherein both the inorganic component and the organic biocide are present as micronized particles.

26. The method of claim 23, wherein the inorganic component is selected from the group consisting of copper, cobalt, cadmium, nickel, silver, tin, zinc and compounds thereof.

15 27. The method of claim 23, wherein the inorganic component is selected from the group consisting of copper, copper hydroxide, copper oxide copper carbonate, basic copper carbonate, copper oxychloride, copper 8-hydroxyquinolate, copper dimethyldithiocarbamate, copper omadine and copper borate.

20 28. The method of claim 23, wherein the inorganic component is copper carbonate or copper hydroxide and the organic biocide is a quaternary ammonium compound selected from the group consisting of alkyldimethylbenzylammonium chloride, dimethyldidecylammonium chloride and dimethyldidecylammonium carbonate.

25 29. The method of claim 25, wherein the inorganic component is copper carbonate and the organic biocide is dimethyldidecylammonium carbonate.

30 30. The method of claim 29, wherein the size of the copper carbonate particles is between 0.05 and 1.0 microns.

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31. The method of claim 23, wherein the inorganic component is copper carbonate and the organic biocide is tebuconazole.

32. The method of claim 23, wherein the inorganic component is a water soluble metal compound and the organic biocide is present as micronized particles.

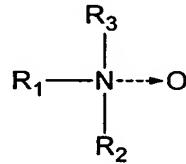
33. The method of claim 32, wherein the inorganic component is selected from the 5 group consisting of copper nitrate, copper sulfate and copper acetate.

34. The method of claim 23, wherein the composition for treating wood further comprises an agent selected from the group consisting of water repellants, colorants, emulsifying agents, dispersants, stabilizers and UV inhibitors.

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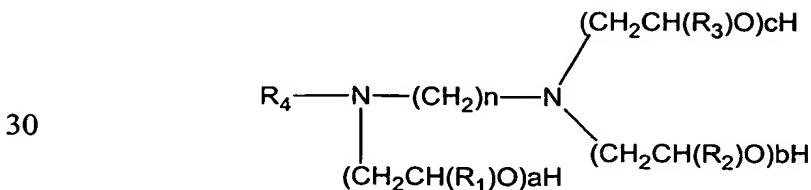
35. The method of claim 23, wherein the composition for treating wood further comprises one or more enhancing agents.

36. The method of claim 35, wherein the enhancing agent is a trialkylamine oxide 15 having the following structure:



where R_1 is a linear or cyclic C_8 to C_{40} saturated or unsaturated group and R_2 and R_3 independently are linear C_1 to C_{40} saturated or unsaturated groups.

25 37. The method of claim 35, wherein the enhancing agent is an alkoxylated diamine having the following structure:



where n is an integer from 1 to 4; R₁, R₂ and R₃ are independently selected from the group consisting of hydrogen, methyl, ethyl and phenyl; a, b and c are each integers from 1 to 6; and R₄ is fatty alkyl of C₈ to C₂₂.

5 38. A method for wood preservation comprising the steps of treating wood with a composition comprising micronized particles selected from the group consisting of metal, metal compounds and combinations thereof, wherein the size of the particles is between 0.005 and 25 microns.

10 39. The method of claim 38, wherein the micronized particles are selected from the group consisting of copper, cobalt, cadmium, nickel, silver, tin and compounds thereof.

15 40. The method of claim 38, wherein the micronized particles comprise metal and/or metal compounds selected from the group consisting of copper, copper hydroxide, copper oxide copper carbonate, basic copper carbonate, copper oxychloride, copper 8-hydroxyquinolate, copper dimethyldithiocarbamate, copper omadine, copper borate and combinations thereof.

20 41. The method of claim 40, wherein the particle size is between 0.005 and 10 microns.

42. The method of claim 41, wherein the particle size is between 0.05 and 1.0 microns.

25 43. The method of claim 40, wherein the treatment of wood is carried out by a process selected from the group consisting of pressure treatment, spraying, dipping and brushing.

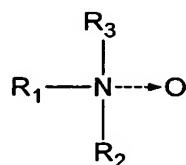
30 44. The method of claim 43, wherein the treatment of wood is carried out by pressure treatment.

45. The method of claim 38 wherein the wood is treated with a composition further comprising an agent selected from the group consisting of water repellants, colorants, emulsifying agents, dispersants, stabilizers and UV inhibitors.

5 46. The method of claim 38, wherein the wood is treated with a composition further comprising one or more enhancing agents.

47. The method of claim 46, wherein the enhancing agent is a trialkylamine oxide having the following structure:

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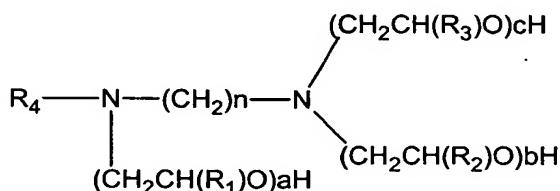
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where R_1 is a linear or cyclic C_8 to C_{40} saturated or unsaturated group and R_2 and R_3 independently are linear C_1 to C_{40} saturated or unsaturated groups.

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48. The method of claim 46, wherein the enhancing agent is an alkoxylated diamine having the following structure:

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where n is an integer from 1 to 4; R_1 , R_2 and R_3 are independently selected from the group consisting of hydrogen, methyl, ethyl and phenyl; a , b and c are each integers from 1 to 6; and R_4 is fatty alkyl of C_8 to C_{22} .

49. A wood preservative composition comprising a dispersion of micronized particles selected from the group consisting of copper, copper hydroxide, copper carbonate,

basic copper carbonate, copper oxychloride, copper 8-hydroxyquinolate, copper dimethyldithiocarbamate, copper omadine, copper borate and combinations thereof, wherein the size of the particles is between 0.005 to 25 microns.

5 50. The composition of claim 49, wherein the size of the particles is between 0.005 and 10 microns.

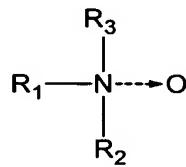
51. The composition of claim 50, wherein the size of the particles is between 0.05 and 10 microns.

10 52. The composition of claim 51, wherein the size of the particles is between 0.05 and 1.0 microns.

15 53. The composition of claim 49, further comprising an agent selected from the group consisting of water repellants, colorants, emulsifying agents, dispersants, stabilizers and UV inhibitors.

54. The composition of claim 49, further comprising one or more enhancing agents.

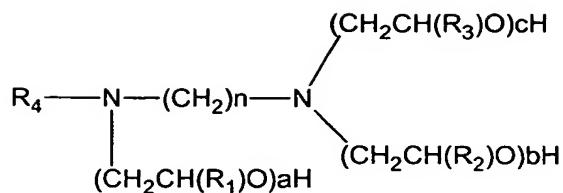
20 55. The composition of claim 54, wherein the enhancing agent is a trialkylamine oxide having the following structure:



30 where R_1 is a linear or cyclic C_8 to C_{40} saturated or unsaturated group and R_2 and R_3 independently are linear C_1 to C_{40} saturated or unsaturated groups.

56. The composition of claim 54, wherein the enhancing agent is an alkoxylated diamine having the following structure:

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where n is an integer from 1 to 4; R₁, R₂ and R₃ are independently selected from the group consisting of hydrogen, methyl, ethyl and phenyl; a, b and c are each integers from 1 to 6; 10 and R₄ is fatty alkyl of C₈ to C₂₂.